DOCUMENT RESUME

ED 352 894 HE 026 094

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TITLE A Model of the Career Development of Tenure Track Assistant Professors. ASHE Annual Meeting Paper.
PUB DATE Sep 92
NOTE 39p.; Paper presented at the Annual Meeting of the Association for the Study of Higher Education (Minneapolis, MN, October 28-November 1, 1992).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Rank (Professional); *Career Development; *College Faculty; Faculty Promotion; Faculty Publishing; Faculty Workload; Higher Education; *Models; Nontenured Faculty; Publish or Perish Issue; *Science Teachers; Sex Differences; Success; Teacher Evaluation; *Teaching Load; Tenured Faculty; Women Faculty
IDENTIFIERS *ASHE Annual Meeting; *University of Minnesota

ABSTRACT

This study tested a model of career development for assistant professors in higher education which permits inferences about the relationships between scholarly characteristics acquired during the probationary period and the probability of achieving tenure. The probationary period is the time between hiring and evaluation for awarding tenure. The study used a sample of the appointment histories of 104 tenure track assistant professors in 13 departments of the University of Minnesota's Institute of Technology and College of Biological Sciences who were hired between 1972 and 1985. The information included data on teaching assignments, publications, citations (including those of coauthors), and previous employment histories. Results found that the model showed an overall prediction of 85 percent and had a highly significant goodness of fit. Citations, and not counted articles, were found to have statistically significant positive effects on promotion probability. The average number of courses taught during the probationary period and the proportion of total courses taught at the graduate level were positively correlated with promotion probability. Women were more likely to achieve tenure. (Includes appendixes containing information on data sources, 10 tables, and a 40-item bibliography). (JB)

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A MODEL OF THE CAREER DEVELOPMENT OF TENURE TRACK ASSISTANT PROFESSORS

September, 1992

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and

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Prepared for presentation
at the annual meeting of the
Association for the Study of Higher Education
Minneapolis, Minnesota
October 28 - November 1, 1992

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ASSOCIATION FOR THE STUDY OF HIGHER EDUCATION

This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Marriott City Center, Minneapolis, Minnesota, October 29 - November 1, 1992. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Abstract

This study presents a model of career development for assistant professors, which permits inferences about the relationships between scholarly characteristics acquired during the probationary period and the probability of achieving tenure. A sample of the appointment histories of 104 tenure track assistant professors in hard science fields who were hired between 1972 to 1985 is utilized, including data on teaching assignments, publications, citations (including those of coauthors), and previous employment histories. Citations, and not counted articles, were found to have statistically significant positive effects on promotion probability. Higher teaching loads were not found to have negative effects on promotion probability, perhaps because departments tend to give smaller assignments to those faculty having difficulty achieving tenure.

Introduction

Considerable discussion of faculty development (Blackburn, 1979; Baldwin, 1979; Brakeman, 1983; Bland & Schmitz, 1988, 1990; Clark & Corcoran, 1989; Whitt, 1991) has occurred over the past twenty years. Among the factors affecting the development of faculty that have been researched are sponsorship, mentorship, and collaborative relationships (Reskin, 1979; Clawson, 1985; Clark & Corcoran, 1986; Blackburn & Pitney, 1988; Haring-Hidore, 1987). In addition, assessments of junior faculty research, teaching and service are considered integral to the decision to confer tenure. (Blackburn & Pitney, 1988; Whitman & Weiss, 1982; Blackburn, Bieber, Lawrence & Trautvetter, 1991).

Some studies (Cameron & Blackburn, 1981; Reskin, 1979) have examined the effects of institutional policies on the acquisition of valued characteristics. Cameron and Blackburn (1981) analyzed how collaboration in the performance of research tasks affected faculty members' publication records, and Reskin (1979) examined the effects of the prestige of an individual's advisor and other early experience variables on outcome measures such as early publications and early citations. However, the majority of researchers in this area do not link these characteristics to additional career outcomes such as promotion and tenure.[1]

Most research on the topic is based on in-depth interviews (Clark & Corcoran, 1986) and questionnaires (Baldwin & Blackburn, 1981). This research approach is valuable for the development of insights and the specification of testable hypotheses. It also has the advantage of allowing the researcher, in effect, to measure complex variables that can influence faculty development by asking questions about them. However, the offsetting difficulties with this approach are twofold. First, the researcher obtains opinions about how

behavior responds to policy variables, rather than actual realized responses. Second, the researcher using questionnaire methods cannot estimate the effects of specific variables influencing behavioral responses while holding constant the effects of others.[2]

Potentially, an important use of this body of research is in the design of institution policies to maximize the career development potential of each faculty member. Key issues include the effects of teaching and other workloads on promotion potential, the rewards that accrue to different types of publication, and the relative access of male and female faculty to opportunities for developing characteristics that lead to career advancement. The present study examines the careers of tenure track assistant professors.

The career advancement of tenure track assistant professors depends in large part on their human capital stock at the time of hire (Bentley & Blackburn, 1990) and the nature of the opportunities afforded them during their probationary appointments (Brakeman, 1983; Clark & Corcoran, 1986 and 1987; Aisenberg, 1988; Johnsrud, 1991).[3] If this is true, an institution concerned with the success of less experienced faculty can benefit from information about how to foster an environment which increases the probability that newly hired tenure track assistant professors will develop productive academic careers (Brakeman, 1983; Clark & Corcoran, 1987, 1989). During an assistant professor's probationary period he or she develops attributes[4] that represent a record of accomplishment or indicate the potential for further accomplishment (Clark & Corcoran, 1986, 1987; Blackburn & Pitney, 1988). Each of the faculty member's acquired characteristics is valuable according to its contribution to key outcomes such as earning tenure, advancing in rank, or receiving salary increases (Blackburn & Pitney, 1988). During the same period, the institution can, to

varying degrees, enhance or inhibit a faculty member's acquisition of the characteristics that most contribute to future success (Brakeman, 1983; Teevan, Pepper, & Pellizzari, 1992; Parson, Sands, & Duane, 1992). As Mathis stated, "The productivity of that faculty member is directly related to whether or not he or she has the skills the institution wishes to reward, and to whether or not the faculty member receives early rewards for applying those skills." (Mathis, 1979,22)

The purpose of this study is to develop a model of career development for tenure track assistant professors at the University of Minnesota. Based on this model, inferences can be made about how tenure track assistant professors' characteristics, developed during the probationary period, subsequently influence their career success. By gaining a better understanding of rewarded faculty characteristics and institutional policies that influence career outcomes, administrators and other decision makers may have better information for the design of personnel policies to support the career development of tenure track assistant professors.[5]

In this study, career success is defined as promotion to associate professor with tenure. The present study is based on a unique sample of the probationary appointment histories of 104 tenure track assistant professors in thirteen departments of the University of Minnesota's Institute of Technology and College of Biological Sciences who were hired during the period 1972 to 1985. For each of these faculty members, we obtained detailed data on teaching assignments, publications, citations of the individual and coauthors, previous employment histories, and promotion and tenure review outcomes. We used a logit model to explain the probability of promotion to associate professor with tenure.

The strength of the approach utilized is that it can overcome the two methodological difficulties mentioned above of observing actual behavior and holding variables constant. However, the present approach has the limitation of measuring only what is quantifiable and reasonably economical to measure.

One potential application of this study's empirical analysis is to the question of gender equity in universities. Typically, gender equity is addressed by examining the possibly unequal rewards that female and male assistant professors receive for the identical or very similar characteristics that they offer academic employers (Theodore, 1986; Davis & Astin, 1987; Aisenberg & Harrington, 1988; Johnsrud, 1991; Johnsrud & Wunsch, 1991). Yet, a potentially more important underlying question is the possibility that the institution provides unequal opportunities to develop rewarded characteristics to different tenure track assistant professors (Simeone, 1987).

Model and method

We collected and analyzed data for a sample of tenure track assistant professors who started at the University of Minnesota between 1972 and 1985 in the College of Biological Sciences or the Institute of Technology. For this sample, we estimated an equation explaining the probability of promotion to associate professor with tenure. This equation was drawn from a general model based in large part on the discussion outlined above.

General model

What factors contribute to the career success of faculty? We hypothesize that the contributing factors fall in the following categories of attributes, experiences, and opportunities: acquired human capital at the time of hire, professional and university

influences, and acquired characteristics that are valued by the employer. An equation taking the following general form was estimated to explain promotion from assistant professor to associate professor with tenure.

$$O_{ij} = f(H_{ij}, U_{ij}, C_{ij})$$

Where O_{ij} = Career outcome i achieved by faculty member j at the end of or within a certain period after his or her period as a tenure track assistant professor. For example, promotion to associate professor with tenure, salary growth, and time to promotion to full professor.

H_{ij} = Human capital development prior to starting at the University of Minnesota. For example, previous research experience, publication record at time of hire, and ranking of institution granting degree.

U_{ij} = Professional and University influences on the faculty member which have direct or indirect effects on the probability of achieving tenure. Indirect effects may occur through impacts on the development of rewarded characteristics during the probationary period. For example, teaching loads, advising, and collaboration with senior faculty.

C_{ij} = Valued characteristic i, possessed by a faculty member j at the end of the normal period as a tenure track assistant professor. For example, strong publication record, and high citation counts. Our future modeling efforts will treat these variables as endogenous.

The following discussion briefly discusses each of these categories of variables.

Outcome Measures (O_{ij}). In this study, the dependent variable is career success of tenure track assistant professors. A dichotomous variable with "1" representing promotion will be used throughout. Additional success measures such as time to promotion to full professor and salary growth are being considered for further research.

Acquired Human Capital at the Time of Hire (H_{ij}). The characteristics that an

individual has developed prior to the time of hire impact the acquisition of characteristics rewarded by the University (Bentley & Blackburn, 1990). Measures controlling for differences among newly hired tenure track professors, such as previous experience and the caliber of the institution from which the individual earned their doctorate are included in the general model of career success.

Professional and University Influences (U_{ij}). Professional and university influences may have a variety of impacts on the ultimate success of a tenure track assistant professor. Policies and practices within fields or institutions can in varying degrees influence the likelihood of a particular assistant professor being promoted to associate professor with tenure. Possible such influences include mentoring or sponsoring relationships[6] within or outside of the employing institution, professional associations and contacts, and teaching[7], advising, and committee loads. Professional and university influences can be divided into two main categories for the purposes of this study: mentorship effects and teaching effects. It is hypothesized that mentorship or sponsorship by senior colleagues in an assistant professor's career has positive impacts on the success of that individual (Clark & Corcoran, 1986, 1989; Aisenberg, 1988; Burke, 1984; Reskin, 1979). Possible indicators of mentorship include measures of coauthorship (Bayer, Smart & McLaughlin, 1990) and the citedness of coauthors (Lawani & Bayer, 1983). We included measures of the citedness of coauthors in our model.

The direction of the effect of teaching is more ambiguous. We postulate that the time commitment necessary for teaching will have a negative effect through taking time away from research activities (Menges & Exum, 1983). However, it is also conceivable that

particular types of teaching may have complimentary effects on research activity thus enhancing an individual's research record and probability of promotion and tenure.[8]

Valued Characteristics (C_{ij}). Strong research performance in the areas of receiving grants, producing publications, and being cited are all characteristics of a faculty member's record which are potentially rewarded by the institution (Clark & Corcoran, 1989; Brakeman, 1983; Exum, 1983; DeSole & Hoffman, 1981). We selected research productivity variables as our measures of valued characteristics in this study, because it is expected that a productive, high quality research record would positively contribute to achieving promotion and tenure (Chamberlain, 1988; Davis & Astin, 1987; Parson, et al, 1992). We selected variables to measure both quantity and quality of research. The number of journal articles was used to reflect quantity of research and total citation counts for each individual in the sample to reflect quality and reputation of research in our model.

Specific Equations

Based upon the general model outlined above, we estimated the following equation explaining the probability of promotion to associate professor with tenure. The dichotomous nature of the dependent variable suggested the use of a logit model. Table 1 lists each variable definition and its data sources.

(1) TENURE = f{AVG_CRS, EARLYCRS, COTEACH, GRAD_CRS, AVG_PUB, LNXTOT_T, PREVEXP, POSTFELL, EMP_NON, PCOCIT0, PCOCIT1, PCOCIT2, GENDER, Departmental Dummies}

The dependent variable, TENURE, takes the value "1" if the individual in our sample was promoted to associate professor with tenure. The value "0" encompasses both the individuals in our sample who were denied tenure and the individuals who left prior to the

tenure decision. The probability of being promoted is explained by variables representing, human capital at the time of hire, professional and university influences, rewarded characteristics, and a set of dummy variables for gender and academic department.

All faculty in our sample were hired in hard sciences departments at the same institution, thus we expect the overall value of prior human capital development to have limited variation across the sample. However, the model includes the following variables in this category: PREVEXP representing years of academic experience prior to hire as an assistant professor at the University of Minnesota, EMP_NON representing the years of previous non-academic but field-related experience prior to hire, and POSTFELL representing the number of years in postdoctoral or fellowship positions.

Professional and university influences are measured by teaching and mentorship variables. These variables include AVG_CRS which is the average number of courses taught per year in the probationary period, EARLYCRS representing the proportion of total courses taught that were taught in the first two year at the institution, COTEACH representing the proportion of total courses that were cotaught with a senior faculty member, and GRAD_CRS representing the proportion of total courses taught at the graduate level. Mentorship effects were captured by three variables, PCOCIT0, PCOCIT1, and PCOCIT2. These variables represent the proportion of the assistant professor's coauthors during the first two years at the University of Minnesota who had in the year of the publication 0, 1-10, and 11-50 cites respectively.

We included two variables, AVG_PUB and LNXTOT_T, measuring rewarded characteristics in the model. The average number of journal articles published per year in

the probationary period and the logarithm of the faculty member's maximum cites in any year during the probationary period.

Dummy variables for gender (1 = female) and the thirteen departments included in the study were also incorporated in the model.

Sampling Design

To study the factors contributing to the success of tenure track assistant professors at the University of Minnesota, we generated a sample of faculty from the Institute of Technology and the College of Biological Sciences. A census of all faculty meeting our criteria was taken. To be included in the sample, a faculty member must have been hired in a tenure track position between 1975 and 1985.[9] We excluded individuals who had worked for an extended period of years as an instructor before being hired on the tenure track. In addition, only those departments where at least one woman was hired during this time period were included.[10]

The final sample consisted of 120 tenure track assistant professors. Sixteen observations were dropped from the analysis due to incomplete data. Of the 104 tenure track assistant professors in our model, 20 were female. 71.2 percent of the faculty members in the sample were promoted to associate professor with tenure. More detailed breakdowns by college, gender, and tenure are provided in Tables 2-5.

Results

Descriptive statistics for the sample of 104 tenure track assistant professors, and for male and female assistant professors separately, are given in Tables 6-8. The estimated logit model showed an overall prediction of 85 percent and had a highly significant goodness of

fit. Results of the logit model estimated to explain the probability of promotion to associate professor with tenure are presented in Table 9.

Two of the four variables controlling for the faculty member's teaching activities in Equation (1) have statistically significant effects on the probability of promotion. Both of these variables, the average number of courses taught during the probationary period, and the proportion of total courses taught at the graduate level, have positive effects. The positive effect of the former variable was not expected, and raises the possibility that the causal relationship is the behavior of departments in allocating teaching loads. We present below an equation explaining departmental choices in determining faculty members' teaching assignments.

One of Equation (1)'s three variables controlling for mentorship was significant: the proportion of the individual's coauthors who had cites in the range 11-50 in the year of the joint publication (PCOCIT2). This variable had an estimated positive effect on the probability of promotion, tending to support the hypothesis that access to well-known colleagues helps a junior scholar in the development of a successful career. It should be noted, however, that the causality underlying Equation (1) could include the behavior of better-known scholars seeking more promising junior scholars as coauthors.

Among variables measuring rewarded characteristics, the variable in Equation (1) controlling for number of articles published did not have a significant coefficient. It is not clear to us why the average number of articles published is not significant in the equation. It is noteworthy that there has been a significant number of cases of junior faculty in the hard sciences of the university studied who have been denied tenure in spite of a large

number of publications. However, the logarithm of the faculty member's maximum cites in a year during the probationary period does have a positive and significant effect.

The variable controlling for gender is positive and significant, suggesting that after controlling for the other variables in the model, women have a higher probability than men of achieving tenure in the hard science. Most of the coefficients on the variables controlling for academic department are statistically significant, implying variability in the constant term across departments. To date, we have not interacted any of the other variables in the model with the departmental dummies.

The Behavior of Departments in Allocating Teaching Loads

The positive relationship in Equation (1) between teaching loads and the probability of achieving tenure raises the possibility that this equation reflects not only the professional development of junior faculty, but also the behavior of departments in allocating teaching loads to these faculty. This possibility is addressed in Equation (2), which is intended to reflect just the latter behavior, i.e. of departments in assigning teaching loads:

(2) AVG_CRS = f{TENURE, GENDER, Department dummies}

The dependent variable is the faculty member's average annual teaching load during his or her probationary period (AVG_CRS). In order to contribute to the interpretability of the equation as reflecting the behavior of academic departments and not the faculty member's career development, the independent variables are chosen either to be those influencing department decisions that are not decision variables of the faculty member during the probationary period or which (in the case of TENURE) represent a forecast of future behavior made by the department. It is assumed that the academic department

makes an unbiased prediction of whether the faculty member will achieve tenure.

The results of the ordinary least squares procedure to explain AVG_CRS are presented in Table 10. In Equation (2), the variable measuring whether an individual was promoted to associate professor with tenure (1 = yes) entered positively and significantly, supporting the hypothesis that departments give lower teaching loads to the junior faculty members they estimate to be less likely to achieve tenure.

The gender variable entered negatively and significantly, suggesting that over this sample, academic departments in the hard sciences give smaller teaching loads to women. Perhaps, these units are attempting to increase females' time for research activities in order to reduce the likelihood of future conflicts over negative tenure decisions.

Conclusion

This paper presents some preliminary results in a long-term research program on faculty career development. These preliminary results have suggested several directions for future inquiry and model improvements.

Planned adjustments to the model presented include improvements in the measures of independent variables, estimation of models explaining additional measures of career success, and improvements in the model used for estimation. Better measures of independent variables may include expanded collection of measures of coauthorship, measures of publication counts as deviations from average publications in the faculty member's department, and inclusion of variables representing other types of publications than journal articles.

We shall utilize our sample more fully by explaining additional career success

measures such as post-tenure salary growth and the time to promotion to full professor.

Two approaches will be taken to improve the model. One, we will treat faculty characteristics such as publications and citations, and professional and university influences, as endogenous variables. The results of Equation (2), explaining average courses taught per year during the probationary period suggest this approach may be fruitful to our understanding of faculty career development. Two, in the present model, TENURE = 0, includes both individuals who left prior to the tenure decision and those who were denied promotion. It is conceivable that some of the early leaves should not be counted as failures. To attempt to account for these possibly different outcomes, we will utilize a multivariate logit model or a duration model in future analyses.

Endnotes

1. For a study which did examine outcomes, see Feldt (1990).

2. For example, opinions about the effects of gender or about changes in publications on one's chances of achieving tenure may differ substantially from the what the effects of these variables actually are, and the correct estimate of either of these effects may vary with the other variables employed in a model explaining tenure rates.

3. For instance, one might hypothesize that heavy teaching loads early in one's probationary appointment will have a negative impact on the probability of achieving tenure by decreasing the time available for research activities. (Menges and Exum, 1983). This time constraint may, therefore, detract from research productivity.

4. For example, a strong research record.

5. Further investigation may also suggest uses for these types of information in the senior faculty development as well.

6. For further discussion of mentorship and sponsorship including definitions of the types of mentoring and sponsoring relationships and the impacts of these relationships, see Kram (1985, 1983); Kram & Isabell (1985); Merriam (1983); Johnsrud (1990); Haring-Hidore (1987); and Goldstein (1979).

7. For additional discussion of teaching loads 'relationship to faculty career development, refer to Blackburn, et al (1991); Whitman & Weiss (1982); Theodore (1986); and Johnsrud & Wunsch (1991).

8. For instance, gradate level teaching may increase access to high quality advisees or graduate research assistants. Also, teaching courses in one's specialty may also have a complementary effect on an individual's research performance.

9. To increase the number of female assistant professors included in the sample, women who were hired in the Institute of Technology and the College of Biological Sciences as early as 1972 were added to the sample.

10. Only departments in these two colleges in which at least one female assistant professor was hired during the stated time period were included in the study. Architecture, Chemical Engineering & Materials Science, Chemistry, Civil & Mineral Engineering, Computer Science, Geology & Geophysics, Mathematics, Mechanical Engineering, Physics & Astronomy, Biochemistry, Botany, Ecology, and Genetics were all included in the study. Aerospace Engineering & Mechanics and Electrical Engineering were not included in the present study. Also, during the period 1972 to 1992, Architecture became a separate college from the Institute of Technology.

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Appendix: Data Sources

A variety of personnel data bases and the University Budget Books were used to identify the sample of University of Minnesota faculty examined in this study. Promotion and tenure records were collected for all faculty who had gone through the promotion and tenure review process. The dependent variable, whether or not an individual had been promoted to associate professor with tenure was collected using the promotion and tenure records and University personnel database. The outcome and the date of promotion or termination were recorded in a database set up for background information on the individual in the study. Promotion and tenure records also provided a good source of information on previous experience, educational history, and publication records.

Measures of human capital at the time of hire in a tenure track position were gathered from a number of other sources in addition to the promotion and tenure records already discussed. For individuals who left prior to reaching the tenure decision, previous experience, educational history, and publication data were obtained by collecting departmental records and Faculty Information forms. A measure of the reputation of the individual's graduate program was gathered from An Assessment of Doctoral Programs in the US (1982). An additional previous experience measure, Prior Service Credit, was gathered by collecting Probationary Tenure Records from the personnel office.

The publications were recorded as listed on each individual's curriculum vitae. In some cases where a vitae was not available, publication data was available from departmental records and faculty information forms. This raw data was used to create various publication measures and identify coauthors. Total cites were collected from the

Science Citation Index for each individual in the sample for each year they were employed at the University of Minnesota. This measure is intended to proxy for the quality of the individual's research record and reputation.

Measures of mentorship were obtained through publication listings. In particular, coauthorship measures were used to proxy for mentoring effects. Using the publication listings provided in curriculum vitaes, lists of coauthors during an individual's first two years at the University of Minnesota were compiled. Cites to these coauthors in the publication year were counted in the Science Citation Index. The total number of citations received was used as a proxy for the reputations of an individual's coauthors. In future research, the mentorship variables may be broken out by whether the coauthor was affiliated with the University of Minnesota or another institution. To create this variable, coauthors were identified as affiliated with the University of Minnesota if they were listed in the University of Minnesota phone directory at the time of coauthorship.

Using the Course Inventory Books for the University of Minnesota, teaching loads were collected for all tenure track assistant professors examined in this study. From this source we were able to gather course indicator and course level, course hours, contact hours, and coteachers. The raw data was used to create variables measuring the average number of courses taught per year in the probationary period, the proportion of total courses taught that were taught in the first two year at the University of Minnesota, the proportion of total courses that were cotaught with a senior faculty member, and the proportion of total courses taught at the graduate level.

TABLE 1: Variable Definitions and Data Sources

VARIABLE DEFINITION	NOTATIONAL FORM	DATA SOURCE(S)
Proportion of total courses taught in first two years at U of MN	EARLYCRS	All teaching load data was obtained from the University of Minnesota Course Inventory Books.
Average number of courses taught per year during the probationary period	AVG_CRS	
Proportion of total courses cotaught with senior faculty	COTEACH	
Proportion of total courses taught at graduate level	GRAD_CRS	
Average number of journal articles published per year in probationary period	AVG_PUB	Promotion and Tenure Review files; Faculty Information forms
Logarithm of the faculty member's maximum annual cites during the probationary period	LNXTOT_T	All citation information was collected from the Science Citation Index.
Years of academic experience prior to hire as assistant professor at U of MN	PREVEXP	Previous experience information was gathered from Faculty Info. Forms, Promotion and Tenure Files, and personennel databases.
Years in post-doctorate or fellowship positions	POSTFELL	
Non-Academic employment but field-related experience prior to hire	EMP_NON	
Proportion of assistant professor's coauthor during first 2 years at U of M who had no cites in the year of publication	PCOCIT0	Science Citation Index
Same as PCOCIT0, but with 1-10 cites in the year of publication	PCOCIT1	
Same as PCOCIT0, with 11-50 cites in the year of publication	PCOCIT2	
Gender of faculty member	GENDER	Faculty Info. Form; Promotion and Tenure Files
Whether person received tenure ("1") or not ("0")	TENURE	Promotion and Tenure Files; University personnel database
Departmental Dummy Variables		University personnel records

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TABLE 2: Sample Totals by Gender & College

	TOTAL	IT	CBS	ARCH
TOTAL	104	86	13	5
FEMALE	20	11	7	2
MALE	84	75	6	3

TABLE 3: Sample Totals by Gender & Tenure

	TOTAL	TENURE	NON-TENURE
TOTAL	104	74	30
FEMALE	20	17	3
MALE	84	57	27

TABLE 4: Sample Totals by Gender & Tenure for the Institute of Technology

	TOTAL	TENURE	NON-TENURE
TOTAL	86	60	26
FEMALE	11	9	2
MALE	75	51	24

TABLE 5: Sample Totals by Gender & Tenure for the College of Biological Sciences

	TOTAL	TENURE	NON-TENURE
TOTAL	13	10	3
FEMALE	7	6	1
MALE	6	4	2

TABLE 6: Descriptive Statistics for All Tenure Track Assistant Professors in the Regression Sample (N=104)

	Regression Sample:			
VARIABLE	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
EARLYCRS	.48	.28	.00	1.00
AVG_CRS	3.71	2.11	.00	13.75
COTEACH	.47	.88	.00	4.91
GRAD_CRS	.16	.10	.00	.50
AVG_PUB	1.80	1.63	.00	9.33
LNXTOT_T	1.79	4.06	-11.51	5.04
PREVEXP	1.56	2.25	.00	13.00
POSTFELL	1.09	1.42	.00	5.00
EMP_NON	.77	2.11	.00	12
PCOCIT0	.12	.24	.00	1.00
PCOCIT1	.18	.26	.00	1.00
PCOCIT2	.19	.28	.00	1.00
GENDER	.19	.40	.00	1.00
TENURE	.71	.46	.00	1.00
CIVMIN	.09	.28	.00	1.00
COMPSC	.10	.30	.00	1.00
MATH	.17	.38	.00	1.00
MECENG	.04	.19	.00	1.00
CHEM	.13	.34	.00	1.00
CHEMENG	.08	.27	.00	1.00
GEOLG	.04	.19	.00	1.00
PHYS	.18	.39	.00	1.00
BIOCHEM	.01	.10	.00	1.00
ECOL	.06	.23	.00	1.00

PLNTBIO	.04	.19	.00	1.00
GENET	.02	.14	.00	1.00

TABLE 7: Descriptive Statistics for Female Tenure Track Assistant Professors in the Regression Sample (N=20)

VARIABLE	REGRESSION SAMPLE : MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
EARLYCRS	.45	.26	.00	1.00
AVG_CRS	2.37	1.25	.00	4.67
COTEACH	.58	89	.00	3.64
GRAD_CRS	.11	08	.00	.27
AVG_PUB	1.18	1.18	.00	4.50
LNXTOT_T	.57	5.41	-11.51	4.80
PREVEXP	2.58	3.31	.00	13.00
POSTFELL	1.18	1.50	.OO	5.00
EMP_NON	1.88	3.31	.00	10.00
PCOCIT0	.19	.36	.00	1.00
PCOCIT1	.17	28	.00	1.00
PCOCIT2	.13	.21	.00	.55
GENDER	1.00	.00	1.00	1.00
TENURE	.85	.37	.00	1.00
CIVMIN	.05	.22	.00	1.00
COMPSC	.05	.22	.00	1.00
MATH	.10	.31	.00	1.00
MECENG	.00	.00	.00	.00
CHEM	.10	.31	.00	1.00
CHEMENG	.05	.22	.00	1.00
GEOLG	.15	.37	.00	1.00
PHYS	.05	.22	.00	1.00
BIOCHEM	.05	.22	.00	1.00
ECOL	.15	.37	.00	1.00

PLNTBIO	.10	.31	.00	1.00
GENET	.05	.22	.00	1.00

TABLE 8: Descriptive Statistics for Male Tenure Track Assistant Professors in the Regression Sample (N = 84)

VARIABLE	REGRESSION SAMPLE : MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
PCRS_M	.49	.28	.00	1.00
CRS_T	4.03	2.16	.86	13.75
PCOT_H_T	.45	.88	.00	4.91
PCRS58_T	.17	.10	.00	.50
ALL_T	1.94	1.69	.00	9.33
LNXTOT_T	2.08	3.65	-11.51	5.04
PREVEXP	1.32	1.86	.00	8.00
POSTFELL	1.07	1.41	.OO	5.00
EMP_NON	.51	1.64	.00	12.00
PCOCIT0	.10	.19	.00	1.00
PCOCIT1	.18	.25	.00	1.00
PCOCIT2	.21	.30	.00	1.00
GENDER	.00	.00	.00	.00
TENURE	.68	.47	.00	1.00
CIVMIN	.10	.30	.00	1.00
COMPSC	.11	.31	.00	1.00
MATH	.19	.40	.00	1.00
MECENG	.05	.21	.00	1.00
CHEM	.14	.35	.00	1.00
CHEMENG	.08	.28	.00	1.00
GEOLG	.01	.11	.00	1.00
PHYS	.21	.41	.00	1.00
BIOCHEM	.00	.00	.00	.00
ECOL	.04	.19	.00	1.00

PLNTBIO	.02	.15	.00	1.00
GENET	.01	.11	.00	1.00

TABLE 9: Logistical Regression Explaining TENURE

Explanatory Variables		Estimated Coefficient (standard error)
EARLYCRS		-2.9875 (1.9835)
AVG_CRS		.6022* (.3084)
COTEACH		1.1091 (.8888)
GRAD_CRS		8.5189* (4.8438)
AVG_PUB		.0261 (.3128)
LNXTOT_T		1.4988** (.6184)
GENDER	(1 = Female)	5.8173*** (1.8941)
PCOCIT0		-.9485 (1.5677)
PCOCIT1		-.3338 (1.4717)
PCOCIT2		2.7515** (1.3831)
CIVMIN	(1 = Civil Mineral Engineering)	-16.3676** (7.7509)
COMPSC	(1 = Computer Science)	-15.5182** (7.5196)
MATH	(1 = Mathematics)	-15.5968** (7.6396)
MECENG	(1 = Mechanical Engineering)	-10.1612 (27.7244)
CHEM	(1 = Chemistry)	-19.4538** (8.7968)
CHEMENG	(1 = Chemical Engineering)	-22.9256** (8.9648)

GEOLG	(1 = Geology)	-13.5670 (52.9709)
PHYS	(1 = Physics)	-18.2150** (8.7505)
BIOCHEM	(1 = Biochemistry)	-21.0549 (61.3852)
ECOL	(1 = Ecology)	-18.5521** (8.6554)
PLNTBIO	(1 = Plant Biology)	-20.6384** (8.8531)
GENET	(1 = Genetics)	-20.2164** (8.4996)
PREVEXP		-.0571 (.1851)
POSTFELL		-.0434 (.3346)
EMP_NON		-.0266 (.2647)
Constant		11.6876* (7.1614)

Note: * significant at the .10 significance level; ** significant at the .05 significance level; *** significant at the .01 significance level

TABLE 10: Ordinary Least Squares Explaining AVG_CRS

Explanatory Variables		
GENDER	(1 = Female)	-1.894997*** (.416308)
CIVMIN	(1 = Civil Mineral Engineering)	-1.512498* (.866468)
TENURE	(1 = Tenure)	(.694332)** (.329856)
COMPSC	(1=Computer Science)	-.463334 (.862224)
MATH	(1=Mathematics)	-1.051154 (.794005)
ARCH	(1=Architecture)	1.962104** (.975404)
CHEM	(1=Chemistry)	-1.542769* (.824844)
CHEMENG	(1=Chemical Engineering)	3.450708*** (.892096)
GEOLG	(1=Geology)	-.651002 (1.063070)
PHYS	(1=Physics)	-1.796772** (.787052)
BIOCHEM	(1=Biochemistry)	.544997 (1.648396)
ECOL	(1=Ecology)	-2.425668*** (.947624)
PLNTBIO	(1=Plant Biology)	-1.012252 (1.035954)
GENET	(1=Genetics)	-.602954 (1.268028)
Constant		2.310916 (.635722)
R2		.10499

Note: * significant at the .10 significance level; ** significant at the .05 significance level; *** significant at the .01 significance level